DOCUMENT RESUME

ED 478 222 CG 032 450

AUTHOR	Attridge, William C.
TITLE	Current Practices & Future Implications for Internet Counseling.
PUB DATE	2004-00-00
NOTE	19p.; In: CyberBytes: Highlighting Compelling Uses of Technology in Counseling; see CG 032 440.
PUB TYPE	Information Analyses (070)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	*Counseling; *Counseling Techniques; *Delivery Systems; Ethics; *History; *Internet; Professional Development; Telecommunications
IDENTIFIERS	*Online Counseling

ABSTRACT

In the counseling profession, the use of the Internet is a novel phenomenon and one that is continuing to attract and demand counselors' attention. There are those who advocate on its behalf, while others scrutinize it with disapproval. It is argued that the counseling profession has both a duty and an ethical obligation to meet the needs and demands of the society they serve. Counselors are obligated to continually challenge their beliefs and acknowledge ever-changing social requirements through professional education, advanced academic instruction and empirical study. This article provides an overview of the Internet and early telecommunications. Internet counseling is discussed, with its advantages, technical limitations, ethical and legal considerations, and current practices and future implications highlighted. (Contains 54 references.) (GCP)

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Current Practices & Future Implications for Internet Counseling

by

William C. Attridge

U.S. DEPARTMENT OF EDUCATION
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Chapter Fifteen

Current Practices & Future Implications for Internet Counseling

by William C. Attridge

The Internet has altered the landscape of our world-wide community, bridging people, cultures, societies and nations together as never before. The Internet has changed our style of relating to one another, not only in terms of technique, but also in terms of expression, language, and social exchange. The Internet is the portal through which we step to negotiate distance, time, and information. It transcends our imagination and seemingly takes on a life of its very own. It is oftentimes a peculiar place, filled with new and exciting ideas just around every corner. It is instantaneous, ever-present and practically breathes. However, in reality, the Internet is a tool, a revolutionary tool to be sure, but a tool nonetheless.

Forty years ago, Walz and Johnston (1963) were first to explore the utility of employing video tape as an aspect of counselor training. As a revolutionary "new" technological tool, the use of video within the margins of practicum must have been a daunting experience for all, no doubt, replete with its own share of critics. Yet, 40 years later, it is unimaginable to think of training counselors without video technology. Today, counselors are confronted with another "new" technological tool, which by comparison, is equally intimidating – The Internet.

In the counseling profession the use of this innovative tool is a novel phenomenon and one that is continuing to attract and demand our attention. There are those who advocate on its behalf, while others scrutinize it with disapproval. However, our profession has both a duty and an ethical obligation to meet the needs and demands of the society we serve. We are obligated to continually challenge our beliefs and acknowledge ever-changing social requirements through professional education, advanced academic instruction and continued empirical study. Our failure or inability as a profession to fully recognize the importance of the Internet as a communication method and counseling medium would be analogous to dismissing Edison and his light bulb simply because it wasn't bright enough.

In his book *Future Shock*, Toffler (1972) writes: "The illiterate of the twenty-first century will not be those who cannot read or write, but those who cannot learn, unlearn, and relearn." Although the notion of performing "counseling" within the confines of the Internet may seem contradictory to our training, the advent of forthcoming technologies promise to make Internet-based counseling attainable and realistic.

Internet counseling in its current state is an imperfect process. This is indisputable. But, the implications for future application are mutually astounding and bold. Imagine two Internets, three, five, or even twenty-five. This notion may not be as unbelievable as it might initially sound. It is in fact, just simply a matter of time.

Overview of the Internet

The launch of Sputnik in 1957 compelled the United States to form the Advanced Research Projects Agency (ARPA) within the Department of Defense to link computers together with the single-minded purpose of sharing information. A global network was first proposed in 1962 and by 1969 the Internet, then known as ARPANET, first went online (Hamman, 2002).

ARPA extended its reach by linking with other computers at four major research universities in the southwestern United States: The University of California at Los Angeles, Stanford Research Institute, The University of California at San Bernardino, and the University of Utah. While the number of sites on the Internet was initially small, additional universities and government organizations quickly came online, making Internet traffic much more difficult to monitor (Hamman, 2002).

The Internet entered its adolescence in the 1970's as the result of Transmission Control Protocol/Internet Protocol (TCP/IP) architecture. This architecture was adopted by the Department of Defense in 1980 and became universally accepted in 1983. The international "Because It's Time Network" (BITNET) began in the spring of 1981 and eventually reached across the United States, and was joined later with its European counterpart, the

European Academic and Research Network (EARN) in 1982. Other cooperating international networks joined over time, to make BITNET a worldwide network (Corporation for Research and Educational Networking, 2002).

BITNET networks connected mainframe computers within the educational community in order to provide communication services by using an electronic mail mechanism called a "listserv" to distribute information. Sending a message to a BITNET list resulted in the message being replicated and sent to all of the subscribers on that list. Persons could subscribe or unsubscribe to a list automatically by sending a message to a particular e-mail address. These listservs and other forms of e-mail discussion groups fashioned another major advancement for the early community of computer users that was beginning to emerge (Thomas, 1995).

In 1986, the National Science Foundation (NSF) designated NSFnet as the official data transfer backbone for the Internet. The NSF maintained this position for nearly a decade and was responsible for establishing the early conventions for Internet applications. Since the Internet was funded by the government, it was strictly limited to research, education and government use, with commercial applications prohibited. This policy continued until the early 1990's when commercial networks began to emerge and it became possible to transfer data traffic from one commercial site to another without passing through the government-funded NSFnet (National Science Foundation, 2002).

In 1989, the European Laboratory for Particle Physics developed a new method for information distribution. This scheme was based upon hypertext, which utilized embedded links within text to unite other textual material. In 1993, hypertext protocol received its greatest popularity as a result of the graphical browser. Mosaic was the first commercial graphical browser to utilize this new technology, with both Microsoft and Netscape quickly developing companion products (Berners-Lee, 1999).

By 1992, the Internet had one million host computers, ARPANET had ceased to exist, personal computers were nine times faster and network bandwidth had become 20 million times greater (Computer Museum History Center, 2002). Today's Internet is composed of millions of interconnected networks and systems that collectively provide a backbone for the transmission of network traffic.

Today, roughly 45% of American's have access to the Internet, representing over 120 million people online, with the average Internet user spending 7.6 hours online per week (Wright, 2000). Charp (2000) estimated that nearly half of all American households are connected to the Internet each hour. By the year 2006, predictions suggest there will be over 900 million Internet users worldwide with growth expected to exceed 30% per year. Most experts predict a high-capacity information infrastructure connecting the developed nations and major metropolitan areas of many developing countries will be complete by 2015 (Hines, 1997).

A Wireless World?

It is often suggested we live in a "wireless world." The truth of the matter is there is nothing further from the truth. In fact, in the year 2000 alone, enough cable was installed worldwide to reach to the moon and back well over 100 times with cable manufacturers reportedly spending more than $2.5 billion in 2001 to expand production facilities to meet the increasing demand (Carter, 2001). The need for insulated wire and cable in the United States will likely increase by over 5% annually through 2004 to approximately $22.7 billion according to a study conducted by the Freedonia Group (Cleveland, 2000). The interesting paradox is that cable products support the development and sustenance of the entire wireless network infrastructure and, despite the onset of wireless products, technology will continue to use wire and cable due to its wide range of applications.

Early Telecommunications

In 1956, the first transatlantic copper wire cable allowed simultaneous transmission of 36 telephone conversations. Other cables soon followed and by the early 1960's overseas telephone calls had reached 5 million per year. Satellite communications arrived in the mid 1960's and by 1980 the telephone system carried in excess of 200 million overseas calls per year. As demands on the telecommunication system continued to increase, the limitations of technology became apparent. During the late 1980's, efforts to harness light itself as a communication method were first realized (Hecht, 1999).

Fiber-Optic Cable

Perhaps the most fundamental law of physics is that nothing can accelerate faster than the speed of light. Light travels at 186,000 miles per second and in fiber-optic cable transmission the medium is optical rather than metallic. Hair-thin, fiber-optic strands within a cable reflect the light that passes through them back inward toward the fiber so light cannot escape the cable, making it theoretically possible to send 400 gigabits per second over a single strand of fiber, the equivalent of sending the text of more than 10,000 volumes of an encyclopedia in one second (Lucent Technologies, 2002).

As electronic signals are fed into tiny semiconductor lasers, the lasers produce pulses of light that travel through the fiber, and at the receiving end, photo-detectors convert the incoming signals back into electricity (Pope, 1994). In spite of the popular perception that satellites are the primary carriers of global communications, the reality is that undersea fiber-optic cables carry approximately 10 times more traffic (Petit, 1999).

Satellite Communications

A satellite is an object that orbits another object due to gravity. For example, the earth is a satellite of the sun, while the moon is a satellite of the earth. Many artificial satellites have been designed and launched for the sole purpose of telecommunications. When a satellite is launched, it is positioned into a certain orbital pattern where it is held in place by the earth's gravitational force (Montgomery, 1997). A satellite receives a microwave signal from a ground station on earth (uplink), then amplifies and re-transmits the signal back to a receiving station at a different frequency (downlink).

There are three predominant orbital positions in space where satellites are typically fixed. The first position is Low Earth Orbit (LEO). This array is located 100 to 300 miles above the earth's surface where satellites travel at a speed of 17,500 miles per hour and circle the entire planet in an hour and a half. The second orbital position is Medium Earth Orbit (MEO), which journey in an oval pattern above the north and south poles at a height of 6,000 to 12,000 miles above the planet. The third common orbital pattern is Geostationary Earth Orbit (GEO). A satellite in a geosynchronous orbit circles the entire earth in 24 hours – the same amount of time it takes for one earth rotation. If GEO satellites are positioned over the equator and travel in the same direction as the earth's rotation they appear "fixed" with respect to a given position on the planet. Satellites in geostationary orbit are positioned 22,282 miles above the earth, where they are always able to "see" the receiving station below, and their signals can span a majority of the planet at once. Three GEO satellites can cover the entire globe with the exception of the north and south poles (Boeing Satellite Systems, 2002).

To launch a satellite is costly; each one, regardless of technology, country of origin or design intent has associated mission costs that range from tens to hundreds of millions of dollars. Satellite rocketry was originally developed as a branch of artillery. Proponents of various reusable launch technologies argue that as long as an "artillery-like" model is maintained, affordable launches will never be possible. Moreover, as launch costs remain excessive, only governments and the very largest of corporations are postured to afford them (Technology Research Report, 1993). Configuring a satellite is complicated and takes considerable time, especially to a variety of orbital inclinations, with most existing spaceports unequipped to handle both equatorial and polar launches (Ordway & Sharpe, 1999).

Unlike cable, satellite Internet service is generally available anywhere in the United States that offers an unobstructed view of the southern sky, making the option appear attractive to consumers who are unable to be accommodated by land-based, broadband Internet service providers. However, satellite dish costs, installation charges, and monthly subscription fees can often make this prospect an expensive venture.

Wireless Technology

Wireless technology enables short-range links between mobile computers, mobile phones, portable handheld devices, and Internet connectivity. The security requirements for wireless applications vary depending upon the sensitivity of the information involved and the specific needs of the user. Although early wireless applications and products took considerable time to appear and often spoke incompatible dialects, wireless is coming of age. Once price stability is attained, truly wireless, inter-equipment communication should become commonplace.

What is Internet Counseling?

Counseling and human development professionals have variously recognized this process within the literature as Internet Counseling, Internet Therapy, CyberCounseling, CyberTherapy, CyberPsychology, e-Therapy, e-Counseling, NetCounseling, WebCounseling and Online Counseling, among others. However, the various monikers associated with the process are far less important than the process itself. In 1995, the National Board for Certified Counselors (NBCC) was first to ethically address the practice of counseling via the Internet. In November of 2001, NBCC adopted a revised statement of principles for guiding the evolving system of Internet counseling, and defined the practice as "asynchronous and synchronous distance interaction among counselors and clients using e-mail, chat, and videoconferencing features of the Internet to communicate" (NBCC, 2001).

Similarly, in October of 1999, the American Counseling Association's Governing Council approved the *Ethical Standards for Internet Online Counseling*. These guidelines established standards for use of electronic communications over the Internet to provide Internet counseling services and are used in conjunction with the *ACA Code of Ethics and Standards of Practice*. The set of standards developed by ACA differ somewhat from the NBCC standards in that the NBCC encouraged providers to inform clients of encryption methods to ensure security of communications, whereas the code set forth by the ACA imposed a much stricter standard by mandating the encryption of all online communications with the exception of general web site information. According to Holmes (2000), "They represent the strictest standards yet adopted concerning mental health interactions on the Internet."

Advantages of Internet Counseling

When evaluating incentives to Internet counseling we discover that many of them are principally client-centered. A 1999 Harris poll found that 60 million people searched the Internet for health information and four of the top 10 most searched health topics were mental health related (Walker, 2000).

The Internet is a particularly useful means for providing services to underserved populations such as clients who may reside in remote or isolated areas, or those who may be homebound as a result of disability or chronic illness.

Certain clients may be actively involved in a traditional counseling relationship and suddenly find themselves relocating to another geographic region but still desire to retain the services of their current counselor. Other clients may experience scheduling difficulties that preclude their ability to engage in traditional office-based counseling and may find this medium more suitable to a fast-paced lifestyle, unusual employment hours or other matters of time conflict.

Some clients may simply convey themselves more expressively in a narrative or distance format, and as such, are more comfortable sharing their feelings through this medium. Other clients may experience initial apprehension or embarrassment about their need for mental health services and could find Internet counseling formats appealing, engaging and non-threatening. These types of encounters would at the very least suggest a client has made a conscious decision to effect a change and is contemplating resolution, making the Internet counselor a valuable "front-line" asset.

For the counselor, Internet counseling may offer cost-containment benefits, provide alternative forums to attract and secure additional clients, evaluate and serve more clients per day, offer scheduling flexibility, enable interaction among experts and peers from other locations and provide new venues for supervisory functions.

Technical Limitations of Internet Counseling

Great efforts have been made to generate and recreate a realistic counseling experience through videoconferencing hardware and software technologies. However, an often overlooked consideration is hardware and software compatibility between the counselor and client. This matter is one of "interface." Interface, in this instance, refers to one computer's ability to interact and coordinate harmoniously with another remote computer. Given the diverse nature of computer systems, satisfactory interface among users is oftentimes difficult to attain without a great deal of prior manipulation, frequently negating the time and effort required. For example, about 20% of all personal computers in use today are Macintosh, compared to approximately 80% who utilize PC's (MAC Facts, 2002). As of 2001, the Macintosh community was over five million strong, making it the biggest

selling personal computer of all time with a new Macintosh sold every nine seconds (MAC Facts, 2002). To achieve any degree of compatibility between these two diverse computing systems is an annoying experience even for the most sophisticated user, with disparity growing ever-wider. Another matter of interface exists even among compatible systems. For instance, a counselor using a state-of-the-art, high-end, videoconferencing system, with others who may only possess lower-quality, desktop systems, will find the quality of their mutual video interaction only to be as good as the worst system, suggesting the counselor either personally provide each client with compatible equipment, or remain content with the more restraining technology.

Limitations to the Professional Relationship

Many existing impediments to Internet counseling are now due in large part to the lack of interactivity normally exchanged between the client and the counselor in the traditional face-to-face office arrangement. When considering the advantages and limitations of dispensing online counseling services, the practitioner should fully examine the ramifications within the context of the professional relationship and a specific theoretical orientation.

One of the questions regarding professional affiliation online is the counselor's ability to foster and maintain trust in the relationship, which is deemed a critical and essential element for effective client outcome. Those who consider Internet counseling impractical call the concept of "rapport" into question. Sussman (1998) suggests this loss of the immediate dialectical process impedes the ability of the counselor to fully and effectively engage their personal style within the online environment.

Others contend that a number of Internet delivery mediums such as e-mail, listservs, bulletin boards and instant messaging systems inhibit certain therapeutic techniques or processes. For example, the processes of "here and now" immediacy, reflecting, questioning, encouraging and maintaining the client "in the therapeutic moment" may not convert soundly within certain online mediums when the counselor is deprived of any verbal or visual cues. However, even with this generalized lack of immediacy compensatory clues are frequently interjected within online communications through the use of "emoticons" and acronyms, which can be very helpful tools for clients to articulate and describe their emotional states (Haas, 2000).

Ethical and Legal Considerations

With Internet counseling there are multiple issues with legal and ethical dilemmas that may seriously place the client or counselor in a position of heightened risk. Great concern has been related to security and confidentiality of private communications and the potential for unauthorized access by Internet service provider (ISP) personnel, co-workers, or prying family members. But, limits to confidentiality exist online as much as they do in the real world (Grohol, 1999). Verifying validity and reliability of client information is another uneasy realm. While there is little doubt that an Internet counselor should secure accurate information, the question really becomes – How? Since anonymity online is a relatively easy feat for most experienced computer users the challenge presented for the Internet counselor is developing solid methods for confirming identity and securing accurate, legitimate, verifiable information.

Internet counselors frequently neglect to fully address the concepts of "informed consent," which is far more critical online than in the office. This generalized failure to adequately furnish all pertinent information germane to the online counseling format includes a failure to clarify the nature and scope of services offered by the provider, disclosure of professional credentials augmented with supplemental information outlining grievance procedures and contact information, descriptive information indicating the provider's preferred theoretical orientation and treatment methods, explanations of limitations to client confidentiality, identifying and fully describing all potential risks and associated benefits of assessment and/or treatment, supplemental referral pathways, full disclosure of service fees, descriptive procedures detailing emergency or crisis assistance and procedures addressing technological failures, equipment malfunctions and technical predicaments. In addition, the NBCC ethical standards for Internet counseling stipulate: "Internet counselors are aware that some clients may communicate in different languages, live in different time zones, and have unique cultural perspectives. Internet counselors are also aware that local conditions and events may impact the client" (NBCC, 2001). Counseling professionals should not only possess an awareness of unique multicultural dimensions, but should further be able to provide evidence and demonstrate how they came to possess such awareness. It is essential for

Internet counselors to make efforts beyond minimum professional standards and obtain documented training when working with clients from varied backgrounds.

Crossing Boundaries

The question of whether the practice of Internet counseling is legal when considering state licensure still remains vague and ambiguous, with most licensing bodies largely remaining silent on the subject. Several states do allow for the practice of counseling across state boundaries even when one is not in possession of a license from that state, and hold the counselor responsible to the laws and regulations of their home jurisdiction. Some states require the counselor to establish a face-to-face relationship prior to developing an online counseling association, while some states have stipulated Internet-based counseling services may not be the practitioner's primary or sole method of practice.

In light of influential and attractive recruitment efforts from corporate counseling entities seeking qualified counseling professionals to provide services for a national or international client base, counselors must be particularly mindful of their state regulations to ensure they are functioning within their boundary of practice. Therapists who counsel people online may be playing Russian roulette with their licenses and insurance. Most mental health professionals are licensed only by the state in which they practice; counseling an online patient who resides elsewhere might be construed as practicing without a license. And while malpractice insurance providers do not specifically ban online therapy, their coverage is contingent on adherence to state licensing laws (Hamilton, 1999).

Electronic Records

Electronic case notes, e-mail communications, treatment information, assessment materials, and archived audio and video data all present a unique common difficulty. The growing movement toward electronic records will fuel the need for electronic privacy (Holmes, 1998). This privacy challenge led to the formulation of *The Standards for Privacy of Individually Identifiable Health Information* which became law in April of 2001. Required by the *Health Insurance Portability and Accountability Act* (HIPAA), the Privacy Rule covers health plans, health care clearinghouses and health care providers who conduct financial and administrative transactions electronically. The Privacy Rule generated a national standard to protect individual health information, and provides clients with additional rights and increased access to their personal medical information.

Suicide, Homicide and Duty to Warn

Suicidal clients present extraordinary difficulties in the online environment. Holmes (1997) notes "an attempt must be made to notify someone who might be in a position to prevent a person from taking his or her own life." This is possible only to the extent that accurate identifying information had been adequately secured and verified. Homicidal threats are a less frequent occurrence in this setting and several state courts, but not all, have ruled that mental health professionals do have a duty to protect someone who has been threatened by either directly warning them of the threat or making the threat known to law enforcement personnel.

Internet Counseling ~ Current Practices

ACES Technology Interest Network

In 1999, the Association for Counselor Education and Supervision (ACES) Technology Interest Network developed a core set of technological competencies for counselor education programs as recommended guidelines for program development. The technological competencies embraced by ACES represent the achievement standards counseling students should obtain through professional academic training. To date, most counseling programs have not required additional coursework in technology that speaks directly to these recommended guidelines, but rather, have elected to integrate supplementary technological functions into course curricula. The ACES technological competencies are outlined as follows:

At the completion of a counselor education program students should:

1. Be able to use productivity software to develop web pages, group presentations, letters, and reports.
2. Be able to use such audio-visual equipment as video recorders, audio recorders, projection equipment, videoconferencing equipment and playback units.
3. Be able to use computerized statistical packages.
4. Be able to use computerized testing, diagnostic and career decision-making programs with clients.
5. Be able to use e-mail.
6. Be able to help clients search for various types of counseling-related information via the Internet, including information about careers, employment opportunities, educational and training opportunities, financial assistance/scholarships, treatment procedures, and social and personal information.
7. Be able to subscribe, participate in and sign off counseling-related listservs.
8. Be able to access and use counseling related CD-ROM databases.
9. Be knowledgeable of the legal and ethical codes which relate to counseling services via the Internet.
10. Be knowledgeable of the strengths and weaknesses of counseling services provided via the Internet.
11. Be able to use the Internet for finding and using continuing education opportunities in counseling.
12. Be able to evaluate the quality of Internet information.

The rationale for integrating technological competency into counselor education programs makes sense as tomorrow's counselor will be driven online by third party payers, public school systems, academic institutions and private employers. These core technological competencies represent a solid platform from which additional technological competence may be pursued and achieved. All counselors should obtain technological expertise beyond these core skills, with advanced proficiencies acquired through continuing education efforts, advanced graduate training and supervised experience.

Internet Service Delivery

Sussman (1998) suggests there are three primary Internet delivery methods used most often today: e-mail, text-based chat and videoconferencing. Even though the bulk of Internet counseling efforts are still accomplished through e-mail correspondence, text-based chat and videoconferencing are gaining greater popularity as improvements to these mediums evolve. Although broadband Internet service providers are more prevalent now than in years past, there still remain many users who do not employ this technology, either as a result of additional costs associated with broadband subscription or a perceived lack of need for enhanced bandwidth.

E-mail Communication

E-mail was first adapted for ARPANET by Ray Tomlinson in 1972, and it was he who selected the "@" symbol on his teletype to link the username and address (Campbell, 1998). By the end of 1999, there were over 335 million established e-mail accounts, which represented a 73% increase from the previous year (Irvine, 2000). E-mail counseling processes involve "asynchronous distance interaction between the counselor and client using what is read via text to communicate" (NBCC, 2001). Typically an e-mail message will go though many points on its path from one computer to another, leaving many wondering about the security and confidentiality of client information. Clients who may happen to use a computer at work are further subject to corporate scrutiny, with company policies generally allowing for access beyond the original recipient.

Text-Based Messaging

Bulletin boards, chat rooms, and other forms of text-based messaging allow people to connect and exchange messages with other individuals who are interested in a particular topic or for more personalized individual communication. Cowles and Singh (2002) indicate more than 41 million people or 40% of the active home Internet population used Instant Messaging (IM) applications in May, 2002. For office users, the number for this

same time period was 12.6 million, or 31% of the total active Internet work population. The most popular IM application for home users was America Online (AOL) Instant Messenger with 22 million unique users, followed by Microsoft's MSN Messenger with 15.7 million users. Multimedia messaging is predicted to surpass text-based messaging technology by 2005. Cowles and Singh (2002) further speculate the number of instant messages sent will peak at approximately 168 million in 2003 and then begin to show a steady decline in future years as a result of advanced video deployment.

Desktop Videoconferencing

Desktop videoconferencing through the Internet may be an effective counseling medium for both the counselor and the client. As with other technologies, its usefulness is directly related to the participants' understanding of the benefits, limitations and utilization strategies.

Desktop videoconferencing is a system that uses a personal computer in conjunction with a desktop video camera and videoconferencing software. These systems are much less expensive than traditional high-end videoconferencing components, but are often more restrictive, with smaller visual viewing areas and lower-quality audio capabilities. Either party may observe "ghost images" when rapid movement occurs, which may detract from the counseling experience. With the advent of dedicated cable, DSL and ISDN systems, Internet counseling through the medium of videoconferencing becomes a more user-friendly platform because the enhanced bandwidth offered provides additional clarity and speed. However, even with increased broadband capability most computer systems are still not functionally sophisticated enough to simulate a truly realistic counseling experience as a result of hardware and software limitations.

Questions regarding the utility of archiving video sessions remain largely unanswered at this time. Clearly, digitally archived videos of client sessions may have utility for purposes of supervision, following client progress or retaining an exact record of treatment. But, the larger issue is one of control.

When viewed in the context of ever-increasing malpractice claims, a full-transcript approach might prove detrimental to a counselor. Archived video is often considered an extension of the treatment record, and in many states clients may have legal access to every aspect of their records.

Online Security and Privacy

Anyone who has spent any significant amount of time online has experienced some assault on their privacy. This occurs so frequently that we often begin to consider these invasions as routine, and subsequently, begin minimizing the impact these intrusions cause.

For example, in 1998, "Free-PC.com" announced an offer that thoroughly excited half a million potential users while making privacy advocates furious. The users were expected to supply the company with personal data such as age, income, marital status, etc., and in return they would receive a free computer with Internet access, an e-mail account and a constant barrage of advertising. However, the company maintained the absolute right to monitor the users' online whereabouts at all times.

Over the years Microsoft has had one of the most dismal records of all with respect to computer security. When it was learned that in every copy of the Windows platform sold Microsoft had installed a "back door" for the National Security Agency, essentially providing the U.S. government with access to each and every computer containing the Windows operating system, the public was outraged (Kettman, 1999). Considering the number of operating systems Microsoft has sold in this country and abroad, one is left to wonder what the implications for the counseling profession are under circumstances where security and client confidentiality is the primary concern.

More often than not, these intrusions are built-in to a software or hardware product as a matter of course without our knowledge or consent and are generally stumbled upon by some watchful eyes that are both skeptical and concerned about our ability to trust those who are charged with our personal and professional online security. Whether the deceit is covert as in the Microsoft case, or intentionally overt, as in the example of FreePC, users should expect a right to informed choice and control.

E-mail Security

America has depended upon the United States Postal Service to keep the mail moving since 1775, and since September 11th, 2001, the post office has done an admirable job of moving the nation's communications by delivering over 20 billion pieces of mail since the tragedy, while maintaining the highest priority on employee and customer safety after a number of isolated incidents involving mail tainted with anthrax (United States Postal Service, 2002). E-mail is much like typical postal mail in that it is highly unlikely that anyone else would have any particular interest in it, but, as we learned after the tragedy of September 11th, we never really know.

E-mail can offer its own unique set of security problems. For instance, consider how someone once utilized Delta Airlines' massive computer system to send out junk mailings to more than 50,000 people at a time (Clothier, 1998). Or, the attack on the FBI's Internet site where a flood of 600,000 requests per minute paralyzed their host computer (Taylor, 1999). Within a week of the NSA disclosure, McCullagh and Glave (1999) reported on two separate security breaches occurring on Hotmail, Microsoft's Internet-based e-mail system, where system hackers were allowing anyone to log into any user account without typing a password. We have all heard of these "online temper tantrums" before, and although most of us may never experience difficulty with our routine e-mail service, there are certain key issues that should be considered along the way. The best way to keep unintended eyes from prying into private e-mail communication is to utilize encryption software that is capable of scrambling the message from anyone except for whom it was originally intended. A second point worthy of mention is e-mail rarely just goes away; it is almost always captured somewhere else even if one thinks it has been deleted. According to Stackpole (1999), "E-mail has become the most requested form of evidence during legal discovery."

Identity Theft

From January to the end of April 2001, the U.S. Treasury's Financial Crimes Enforcement Network received 332 reports of identity theft, compared with 637 cases during the year 2000, with only 267 cases in 1999 (Pappas, 2001).

Personal privacy on the Internet has not become a major epidemic as of yet. However, as Internet thieves develop more sophisticated tools this could quickly change. By instituting simple precautions now one can protect an online privacy invasion in the future.

Digital Certificates & Electronic Signatures

In 2000, the 106th Congress passed the *Electronic Signatures in National and Global Commerce Act*, enabling important documents to become legally binding with the use of a digital signature. Digital certificates are at the heart of a public key infrastructure (PKI). A PKI includes organizations called "certification authorities" that issue, manage and revoke digital certificates. Entities known as "relying parties" use these certificates as authentication, while "clients" are those who request, manage and use the certificates. VeriSign is an example of a well-known, commercial provider which issues digital identifications and enables authenticated, 128-bit encryption for secure online payments (VeriSign, 2002).

A digital signature is yet another method of ensuring e-mail authenticity and assures the recipient content has not been altered in any way by anyone other than the document originator. This method of authentication is currently employed when logging on to member-only sites, making credit card purchases, brokerage trading, and voting (Lomangino, 1999).

Privacy Organizations

Every new advance in Internet technology generates one or more new security threats. Thankfully, there are both online and offline organizations constantly monitoring computer security.

EPIC is a public interest research center in Washington, D.C. It was established in 1994 to focus public attention on emerging civil liberties issues and to protect privacy, the First Amendment and constitutional values. EPIC is a project of *Fund for Constitutional Government*, and works in association with *Privacy International*

(an international human rights group based in London, UK), *Global Internet Liberty Campaign, the Internet Free Expression Alliance, the Internet Privacy Coalition* and the *Trans Atlantic Consumer Dialogue* (TACD).

The *Electronic Frontier Foundation (EFF)* is a non-profit, non-partisan organization working in the public interest to protect fundamental civil liberties, including privacy and freedom of expression in the arena of computers and the Internet. EFF was founded in 1990, and is based in San Francisco, California, with offices in Washington, D.C., and New York City.

TRUSTe is an initiative that was initially formed in 1996, and utilizes the "trustmark" symbol as an online branded seal for display on member sites. The "trustmark" seal is awarded only to those Internet sites which adhere to the pre-established privacy principles and agree to comply with ongoing TRUSTe oversight and consumer resolution procedures.

The *Better Business Bureau Online* is a wholly owned subsidiary of the Council of Better Business Bureau. The BBB's online mission is to promote trust and confidence on the Internet through their "online reliability" and "privacy seal" programs. The BBB's Internet site seal programs allow companies to display the BBB seals after evaluation and confirmation they have met program requirements. It confirms a company stands behind its online privacy policy, and has met the program requirements pertaining to methods of personal information collection and dissemination.

The *Health On the Net Foundation* was formed in 1996 in response to consumer need for accurate and reliable health care information on the Internet. The uncertainty of medical information provided by many Internet sites was the impetus for the development of the HONcode system. The program is a self-regulating, voluntary certification system, again, based upon an "active seal" concept. While primarily intended for health care, the blue-and-red HONcode seal on subscribing Internet sites also helps users identify alternative sources of reliable information.

Internet Counseling - Future Implications

Electrical Numerical Integrator and Computer (ENIAC) ~ A Look Back

ENIAC was the world's first electronic digital computer and was developed by Army Ordnance to compute World War II ballistic firing tables (Weik, 1961). The ENIAC was the prototype from which modern computers have evolved and it embodied almost all of the components and concepts of today's high-speed, electronic digital computers. The ENIAC computer was positioned at the Moore School of Electrical Engineering at the University of Pennsylvania, piece by piece, with final assembly taking place in the fall of 1945.

By today's standards, ENIAC was an enormous piece of machinery. It weighed over thirty tons, contained 18,000 vacuum tubes and 1,500 relays, with hundreds of thousands of resistors, capacitors, and inductors, and took up a space of 16, 200 square feet. ENIAC was a forerunner in the computer field during the period of 1949 through 1952 when it served as the main computational workhorse for the country. Ultimately, as years and technology advanced, it became evident ENIAC was no longer as cost-efficient as some of its more recent counterparts, and work loads were gradually shifted to other computers. At 11:45 p.m., on October 2nd, 1955, the power to ENIAC was disconnected (Weik, 1961).

The Future of Today

There is growing recognition the Internet will continue to expand at a phenomenal rate. It is also understood that with each major enhancement will come modifications to our styles of access, patterns of engagement and methods of interaction. This section is dedicated to a review of sophisticated innovations that are gaining our attention now and will strongly influence our future interactions.

Spaceway Satellites

Spaceway is a next-generation satellite system designed by Hughes Electronic Corporation. Spaceway will begin satellite launches in 2003, with commercial service to North America scheduled for 2004. These satellites will provide high-speed, bandwidth-on-demand telecommunications, and operate in the globally assigned Ka-band spectrum. The satellites' unique architecture will allow individuals to communicate directly without connecting through a central server. Bandwidth-on-demand means users will pay only for the bandwidth their applications require (Dore, 2002).

Internet2

Internet2 is a not-for-profit consortium, led by over 190 universities who are developing and deploying advanced network applications and technology such as virtual laboratories, digital libraries and independent distance learning applications. With participation by over 60 leading companies the key goals of this effort will be to accelerate the dissemination of advanced Internet technology. Internet2 is not a separate physical network and will not replace the traditional Internet, but rather, brings together institutions and resources from academia, industry and government to develop new technologies and capabilities that can then be deployed to the global Internet. Internet2 will also benefit non-university members of the educational community, especially K-12 and public libraries, by bringing resources to the fore that have previously been reserved only for advanced institutions.

The National Tele-Immersion Initiative (NTII)

One of the most promising and exciting technologies to emerge from the Internet2 project for the counseling profession is Tele-Immersion. The National Tele-Immersion Initiative (NTII) is a government-sponsored effort dedicated to the research and development of a real-time, three-dimensional environment which provides a sense of shared presence with distant individuals. This research project began over five years ago as a companion project of Internet2. Jaron Lanier, a computer scientist often described as "the father of virtual reality," is now guiding the attempt to validate the Internet of tomorrow with this innovative technology. Lanier sees Tele-Immersive techniques as building blocks for the office of tomorrow, where users from across the world might collaborate as if they were all in the same physical room. With mobile rather than stationary camera arrays, viewers can establish a Tele-presence in remote or hazardous areas. Lanier expects Tele-Immersion to fundamentally change how we view both our real and virtual worlds (Lanier, 2001).

In a Tele-Immersive environment computers recognize the presence and movements of individuals and objects, track those images, and then allow them to be projected onto realistic, stereo-immersive surfaces (Lanier, 2001).†Tele-Immersion is achieved through the use of a Telecubicle, which is a virtual office that can appear to become one quadrant in a larger shared virtual office space. A Telecubicle has a stereo-immersive desk surface with at least two stereo-immersive walls. These three display surfaces meet in the formation of a desk against a corner. When a Telecubicle is linked to others on the Internet the walls appear to be transparent passages to the other cubicles. Four Telecubicles can be joined in virtual space at once so that each forms a quadrant of a larger virtual whole. There is no formal beginning or ending to a Tele-Immersion session, one simply sits down and starts to work with others who are present at their own location.

Current participants in the NTII include:

- Advanced Network and Services
- Brown University
- University of North Carolina at Chapel Hill
- The University of Pennsylvania
- Naval Postgraduate School
- Carnegie Mellon University
- Columbia University
- The University of Illinois at Chicago
- The University of Southern California

Implementation of this new technology could effectively eliminate many of the known barriers to Internet counseling. This innovation would offer clients and counselors alike unprecedented access to services, assessment, consultation and supervision. This technology serves to eliminate the complexities associated with immediacy, theoretical integration, and many other areas of practical, ethical, and legal concern that now prove challenging for the Internet practitioner.

Next Generation Internet (NGI)

The Next Generation Internet (NGI) initiative is a multi-agency Federal research and development program that is designing advanced networking technologies and demonstrating these capabilities on test beds that are 100 to 1,000 times faster than today's Internet. Internet2 and the federally-led NGI are parallel and complementary initiatives that are working together in many areas. For example, through participation in a NGI program, over 150 Internet2 universities have received competitively awarded grants to support connections to advanced backbone networks such as Abilene.

The NGI program focus includes:

1. Advanced infrastructure development (networks that perform at much greater levels than today's commercial Internet).
2. Advanced applications development.
3. Research into technologies that will enable advances in infrastructure and applications.

Biometric Identification

Biometrics, already utilized to a limited degree today, will take another major step in the future. As security concerns continue to mount, biometrics could prove more useful and reliable than identification cards, personal identification numbers (PINs) and passwords typically employed today. There are seven basic ways biometrics is utilized to identify a person: fingerprint, hand, facial, voice, iris, retinal, and signature scan, with fingerprint scanning considered the most popular. The barriers to wide-spread use of this technology are high costs associated with hardware, but affordability is forthcoming. In addition, Compaq and Acer have both released laptop PC's with finger scanning devices and built-in software, while Microsoft is incorporating biometric capabilities into future versions of the Windows operating platform.

Voice Recognition Systems

Although voice recognition systems are available today, they are not widely used because of their unacceptable level of accuracy. These systems currently have significant difficulty understanding different human syntaxes and continually require adjustments so users may issue commands to accurately open files and menus. Improvement to this technology is also on the horizon, providing the counselor with abilities to transcribe entire sessions through voice recognition. As the accuracy and reliability of these systems improve they will further offer the ability to convert video materials into various narrative formats as routine transcription records.

Microsoft is integrating speech and handwriting recognition more deeply into the Windows operating platform and Tablet PC's may be among the first devices to transform the way users take notes and use computers. Microsoft's natural-language processing group is also developing artificial intelligence capabilities for the PC that could enable speech translations into many different languages (Jensen, Heidorn & Richardson, 1993).

The Wireless Workplace

Powered by improvements and increased adoption of wireless technologies such as Bluetooth wireless products and General Packet Radio Service (GPRS), wired connections in the workplace will become a thing of the past. Bluetooth technology will spearhead increased connectivity between PC's, handhelds, printers and other peripheral devices. High-capacity, wireless devices will become more affordable and available to users, enabling counselors to make network and Internet connections while traveling or working from home. Advanced wireless communications will significantly improve the transmission of video and data across networks, and as a result, tablet computers, handhelds, wireless videoconferencing terminals and videophones will proliferate. Personal Digital Assistants (PDAs) doubling as cell phones are now being introduced and represent the genesis of hardware equipment dedicated toward the wireless workplace.

BlueSpace

BlueSpace is an interactive office system under development by IBM and office furniture manufacturer Steelcase. The features of this office structure include a touch screen that resides next to the computer monitor that allow users to adjust room temperature, air flow, and lighting, as well as instant calendar planning and co-worker communication. The system further offers video projector displays which can cast images on walls, floors, desktops and other surfaces with wireless sensors that allow a user's finger to act as a cursor. This arrangement also provides a moving rail with a work surface that rotates in a complete circle and enables the user to shift work space as needed. BlueSpace is intended to increase employee collaboration, utilize existing space more efficiently and attract and retain workers (IBM, 2002). This technology appears to be an early forerunner of Tele-Immersion under development by Internet2. Together, these and related wireless technologies will enable the counselor to fully integrate the technology toward truly realistic counseling experiences on the Internet.

The Future of Technology

Most experts agree that by the year 2020 the silicon microchip will have reached the absolute physical limits of performance, and further improvement will be impossible. In 1965, just after the integrated circuit was first discovered, Gordon Moore, semi-conductor engineer and co-founder of the Intel Corporation, first observed the amount of information storable on a given amount of silicon roughly doubled every year since the technology was invented. This relationship, called "Moore's Law," held true until the late 1970's at which point the doubling effect time frame slowed down to approximately every eighteen months (Webopedia, 2002).

Researchers are currently exploring a variety of methods to keep the technological revolution moving forward toward the post-silicon age. These research agendas include nanoscale computers using organic chemicals, quantum principles, light and deoxyribonucleic acid (DNA).

It is too early to speculate with any certainty which of these new technologies, if any, will serve as the preferred information processing method of the future. However, current research holds great promise among many of these new possibilities.

Quantum Computing

Quantum behavior acts as a wave at a subatomic level. Quantum devices would provide a new type of logic and could compute huge numbers in a matter of minutes that would take years for today's most powerful supercomputer. Beyond the ordinary binary "on" (represented by the number 1) and "off" (represented by 0), quantum computing has a third state that is both 1 and 0 at the same time.

A qubit is a quantum-bit, that is, a bit of information that can be both zero and one at the same time.†Thus, a computer working on a qubit rather than a standard bit can make calculations using both values simultaneously.†A qubyte, being made up of eight qubits, can be all values from zero to 255 simultaneously.†Extending this concept to multi-qubyte systems, it can be seen that there is potential for computational efficiency beyond anything possible with today's computers (Qubyte, 2002). To date, scientists have constructed machines with up to seven qubits, but scaling the machines to usable sizes is still many years away (MSNBC, 2000).

Holographic Optical Data Storage

Optical data storage has evolved from several past generations of optical recording systems including the CD and DVD. Holographic storage mediums break through the density limits of conventional storage by going beyond recording on the surface of a disk to recording through the full depth of the medium.

Unlike other technologies that record one data bit at a time, holographic storage allows a million bits of data to be written and read in a single flash of light. This enables transfer rates significantly higher than current optical storage devices. Combining higher storage densities, faster transfer rates, with more durable, reliable, low cost media, poises holographic storage as a compelling choice for the next generation (Coufal, Psaltis, & Sincerbox, 2000).

DNA Computing

Just like a string of binary data is encoded with ones and zeros, a strand of DNA is encoded with four bases represented by the letters A, T, C, and G. Researchers are using these strands of DNA by assigning the four nucleic acids instead of the binary ones and zeros.

A molecular computer using this type of technology could be 100 billion times faster than today's fastest personal computers while stored in approximately 1 trillionth the space. Although real-world applications are probably at least a decade away, this research is a major step in the effort to build the supercomputer of the future (Ryu, 2002).

Conclusion

Although there are no foregone conclusions, it would appear that Internet counseling will one day emerge as a viable method of service delivery as we become increasingly accustomed to improved methods of online interaction which offer secure, reliable processes for embracing human relationships.

Internet counseling may never, and most probably, should never, fully replace customary or traditional forms of counseling. But, as a technological adjunct to conventional methods, Internet counseling may offer utility for enhanced assessment, care, treatment, follow-up, and assorted new counseling functions.

Today, there remain many unanswered questions. As this territory is explored, further apprehensions will naturally evolve.

Developers and researchers seeking to infuse new technological life into our existence often fail to consider fundamental human behavior. Our contribution to this process should be to continually evaluate, research, and report the suitability of emergent technologies as they relate to our professional requirements. A passive approach will not serve to stimulate advancements in a direction that sustains Internet counseling, but rather, will only slow and frustrate the progression.

As we recall our struggles with new "tools" of the past we are reminded of the importance of patience and understanding. Until such time as new technologies are realized and established methods for this paradigm become known we would be wise to proceed with awareness, retain our optimism, and always look toward the future.

References

Association for Counselor Education and Supervision. (1999). *Technical competencies for counselor education students*. Alexandria, VA: Author. Retrieved August 1, 2002, from http://filebox.vt.edu/users/thohen/competencies.htm

Berners-Lee, T. (1999). *Weaving the Web: The original design and ultimate destiny of the World Wide Web by its inventor.* Harper Publishing: San Francisco, CA.

Boeing Satellite Systems. (2002). *What is a satellite?* Retrieved December 12, 2001, from http://www.boeing.com/defense-space/space/bss/sat101.html

Campbell, T. (1998). *The first e-mail message*. Retrieved June 4, 2002, from http://www.pretext.com/mar98/features/story2.htm

Carter, R. (2001). Making the connection. *Engineering and Mining Journal, 202*(3), 28-34.

Charp, S. (2000). The role of the Internet: Editorial. *Technological Horizons in Education Journal. 27*(8), March, 8-9.

Cleveland, O. (2000). Wire, cable growth driven by fiber-optics. *Control Engineering, 47*(9). 12.

Clothier, M. (1998). *Don't leave your e-mail account susceptible to Internet interlopers.* Atlanta Journal and Constitution, (October 18, 1998).

Computer Museum History Center. (2002). *History of the Internet.* Retrieved May 12, 2002, from http://www.computerhistory.org/index.page

Corporation for Research and Educational Networking. (2002). *CREN history and future.* Retrieved June 6, 2002, from http://www.cren.net/cren/cren-hist-fut.html

Coufal, H. J., Psaltis, D., & Sincerbox, G. (2000). *Holographic data storage.* Springer-Verlag Publishers: Berlin.

Cowles, R., & Singh, M. (2002). *Internet privacy issues: How should they be resolved?* Retrieved August 3, 2002, from http://www.dataquest.com

Dore, R. (2002). *Spaceway satellite to debut in 2003.* Hughes Electronics, Inc., Retrieved January 12, 2002, from http://www.hughes.com/home/default.xml

Grohol, J. M. (1999). *Best practices in e-therapy: Confidentiality and privacy.* Retrieved March 24, 2000, from http://www.ismho.org/issues/9901.htm

Haas, C. (2000). Online counseling presents challenges for mental health experts. *Counseling Today, 42*(8), 18.

Hamilton, A. (1999). On the virtual couch. *Time magazine, 153*(20), 71.

Hamman, R. (2002). *History of the Internet, WWW, IRC, and MUDS.* Retrieved June 6, 2002, from http://www.socio.demon.co.uk/history.html

Hecht, J. (1999). *City of light: The story of fiber-optics.* Oxford University Press: New York, NY.

Hines, A. (1997). Wiring the globe. *The Futurist, 31*(6), 11.

Holmes, L. (1997). *Suicide on the Internet.* Retrieved February 10, 2000, from http://mentalhealth.about.com/health/mentalhealth/library/weekly/aa101397.htm

Holmes, L. (1998). *Online psychoanalyst opens shop.* Retrieved February 10, 2000, from http://mentalhealth.about.com/health/mentalhealth/library/weekly/aa120798.htm

Holmes, L. (2000). *A stricter standard for online counseling.* Retrieved March 24, 2000, from http://mentalhealth.about.com/health/mentalhealth/library/weekly/aa032000a.htm

International Business Machines, Inc. (2002). *IBM and Steelcase create "office of the future."* Retrieved August 3, 2002, from http://www.ibm.com/news/us/2002/01/143.html

Irvine, M. (2000). *E-mailers delete the rules of writing.* Retrieved March 29, 2000, from http://www.msnbc com/news/388509.asp

Jensen, K., Heidorn, G. E., & Richardson, S. D. (1993). *Natural language processing.* Kluwer Academic Publishers: Boston, MA.

Kettman, S. (1999, October 3). MS denies Windows "spy key." *Wired News.* Retrieved October 3, 1999, from http://www.wired.com/news/technology/0,1282,21577,00.html

Lanier, J. (2001). Virtually there: Three-dimensional tele-immersion may eventually bring the world to your desk. *Scientific American,4*(1), Retrieved May 10, 2001, from http://www.sciam.com/2001/0401issue/0401lanier.html

Lomangino, K. (1999). Digital signatures protect against fraud. *Internet Medicine, 4*(7), 2-5. Retrieved February 12, 2000, from http://services.medscape.com/LWW/IM/1999/v04.n07/im0407.04.html

Lucent Technologies, Inc. (2002). *Scientists find the glass ceiling*. Retrieved June 3, 2002, from http://www.bell-labs.com/project/feature/archives/glassceiling/

McCullagh, D., & Glave, J. (1999, January 10). Hotmail accounts exposed to all. *Wired News*. Retrieved January 10, 2001, from http://www.wired.com/news/print/0,1294,21490,00.html

MAC Facts. (2002). *MAC Facts*. Retrieved July 10, 2002, from http://www.13idol.com/mac/macfacts.html

Montgomery, J. (1997). *The orbiting Internet: Fiber in the sky*. Byte. Retrieved January 4, 1999, from http://www.byte.com/art/9711/sec5/art1.htm

MSNBC. (2000, May 24). Huge leap for quantum computers. *MSNBC*. Retrieved May 24, 2000, from http://zdnet.com.com/2100-11-521030.html?legacy=zdnn

National Board for Certified Counselors. (2001). *The practice of Internet counseling*. Retrieved March 10, 2002, from http://www.nbcc.org/ethics/webethics.htm

National Science Foundation. (2002). *An overview of the first fifty years*. Retrieved July 18, 2002, from http://www.nsf.gov/od/lpa/nsf50/nsfoutreach/htm/hist_z2/hist_stc.htm

Ordway, F.I., & Sharpe, M.R. (1999). *The Rocket Team*. Cambridge Mass: MIT Press.

Pappas, C. (2001). *Are you who you say you are? Identity theft more than doubling*. Reuters News Service. Retrieved October 22, 2001, from http://cma.zdnet.com/texis/techinfobase/techinfobase

Petit, C. (1999). Spaghetti under the sea. *U. S. News and World Report, 127*(8), 56.

Pope, G. T. (1994). Bytes in the fast lane. *Discover, 15*(1), 93-95.

Qubyte. (2002). *Quantum computers and Moore's law*. Retrieved July 10, 2002, from http://www.qubyte.com/

Ryu, W. (2002). *DNA computing: A primer*. Retrieved December 11, 2001, from http://www.arstechnica.com/reviews/2q00/dna/dna-1.html

Stackpole, K. (1999). *Frontlines*. Retrieved December 15, 2000, from http://www.opengroup.org/comm/the_message/magazine/mmv5n4/front.htm

Sussman, R. J. (1998, May 1). Counseling online. *CTOnline*. Retrieved December 26, 1999, from http://www.counseling.org/ctonline/sr598/sussman.htm

Taylor, C. (1999). Geeks vs. g-men. *Time, 153*(23), 64.

Technology Research Report. (1993, August 12) Edition 6.9, *Bear Stearns and Co. Inc.*: New York, NY.

Thomas, E. (1995). *The history of listserv*. Retrieved July 11, 2002, from http://www.lsoft.com/products/default.asp?item=listserv-history

Toffler, A. (1972). Future shock. *Bantam-Dell Publishing Group*: New York, NY.

United States Postal Service. (2002). *Postal service in the United States*. Retrieved July 11, 2002, from http://www.usps.com/welcome.htm

VeriSign. (2002). *Secure your critical communications*. Retrieved December 10, 2001, from http://www.verisign.com/

Walker, D. (2000, March 31). Surfing for peace of mind. *CBS News Online*. Retrieved March 31, 2000, from http://www.cbsnews.com/stories/2000/03/20/tech/main174167.shtml

Walz, G. R., & Johnston, J. A. (1963). Counselors look at themselves on video tape. *Journal of Counseling Psychology, 10*(3), 232-236.

Webopedia. (2002). *Moore's law*. Retrieved July 29, 2002, from http://www.webopedia.com/TERM/M/Moores_Law.html

Weik, M. H. (1961). The ENIAC story. *The Journal of the American Ordnance Association. 12*(1), 7-16.

Wright, R. (2000). Will we ever log-off? *Time magazine, 155*(7), 56-108.

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